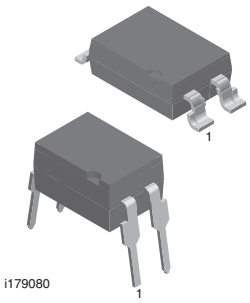
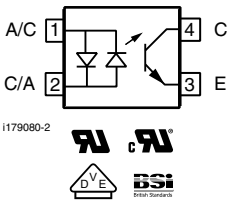
Optocoupler, Phototransistor Output, AC Input





FEATURES

- Good CTR linearity depending on forward current
- Isolation test voltage, 5300 V_{RMS}
- High collector emitter voltage, V_{CEO} = 70 V
- Low saturation voltage
- Fast switching times
- Low CTR degradation
- Temperature stable
- Low coupling capacitance
- End-stackable, 0.100" (2.54 mm) spacing
- High common-mode interference immunity
- Compliant to RoHS Directive to 2002/95/EC and in accordance WEEE 2002/96/EC

Pb-free

e3

RoHS COMPLIANT

DESCRIPTION

The SFH620A (DIP) and SFH6206 (SMD) feature a high current transfer ratio, low coupling capacitance and high isolation voltage. These couplers have a GaAs infrared diode emitter, which is optically coupled to a silicon planar phototransistor detector, and is incorporated in a plastic DIP-4 or SMD package.

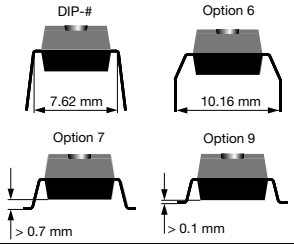
The coupling devices are designed for signal transmission between two electrically separated circuits. The couplers are end-stackable with 2.54 mm lead spacing. Creepage and clearance distances of > 8 mm are achieved with option 6. This version complies with IEC 60950 (DIN VDE 0805) for reinforced insulation to an operation voltage of 400 V_{RMS} or DC.

AGENCY APPROVALS

- UL1577, file no. E52744 system code H, double protection
- CSA 93751
- BSI IEC 60950; IEC 60065
- DIN EN 60747-5-2 (VDE 0884)/DIN EN 60747-5-5 (pending), avialable with option 1

ORDERING INFORMATION

S	F	H	6	2	0	x	-	#	X	0	#	#	T
PART NUMBER								CTR BIN	PACKAGE OPTION				TAPE AND REEL



AGENCY CERTIFIED/PACKAGE	CTR (%) ± 10 mA					
	SFH620A			SFH6206		
UL, cUL, BSI	**40 to 125**	**63 to 200**	**100 to 320**	**40 to 125**	**63 to 200**	**100 to 320**
DIP-4	SFH620A-1	SFH620A-2	SFH620A-3	-	-	-
DIP-4, 400 mil, option 6	SFH620A-1X006	SFH620A-2X006	SFH620A-3X006	-	-	-
SMD-4, option 7	-	SFH620A-2X007T (1)	-	-	-	-
SMD-4, option 9	-	-	-	SFH6206-1T (1)	SFH6206-2T (1)	SFH6206-3T (1)
VDE, UL, cUL, BSI	**40 to 125**	**63 to 200**	**100 to 320**	**40 to 125**	**63 to 200**	**100 to 320**
DIP-4	SFH620A-1X001	SFH620A-2X001	SFH620A-3X001	-	-	-
DIP-4, 400 mil, option 6	-	SFH620A-2X016	SFH620A-3X016	-	-	-
SMD-4, option 7	-	SFH620A-2X017T	-	-	-	-
SMD-4, option 9	-	-	-	-	SFH6206-2X001T (1)	SFH6206-3X001T (1)

Note

- Additional options may be possible, please contact sales office.

(1) Also available in tubes; do not add T to end.

ABSOLUTE MAXIMUM RATINGS (T_{amb} = 25 °C, unless otherwise specified)				
PARAMETER	**TEST CONDITION**	**SYMBOL**	**VALUE**	**UNIT**
INPUT				
DC forward current		I_F	± 60	mA
Surge forward current	$t_p \leq 10$ µs	I_{FSM}	± 2.5	A
Power dissipation		P_{diss}	100	mW
OUTPUT				
Collector emitter voltage		V_{CE}	70	V
Emitter collector voltage		V_{EC}	7	V
Collector current		I_C	50	mA
	$t_p \leq 1$ µs	I_C	100	mA
Power dissipation		P_{diss}	150	mW
COUPLER				
Isolation test voltage between emitter and detector	t = 1 s	V_{ISO}	5300	V_{RMS}
Isolation voltage		V_{IORM}	890	V_P
Total power dissipation		P_{tot}	250	mW
Creepage distance			≥ 7	mm
Clearance distance			≥ 7	mm
Insulation thickness between emitter and detector			≥ 4	mm
Comparative tracking index per DIN IEC112/ VDE 0303, part 1		CTI	175	
Isolation resistance	V_{IO} = 500 V, T_{amb} = 25 °C	R_{IO}	≥ 10^{12}	Ω
	V_{IO} = 500 V, T_{amb} = 100 °C	R_{IO}	≥ 10^{11}	Ω
Storage temperature range		T_{stg}	- 55 to + 150	°C
Ambient temperature range		T_{amb}	- 55 to + 100	°C
Junction temperature		T_j	100	°C
Soldering temperature (1)	max. 10 s, dip soldering distance	T_{sld}	260	°C

Notes

- Stresses in excess of the absolute maximum ratings can cause permanent damage to the device. Functional operation of the device is not implied at these or any other conditions in excess of those given in the operational sections of this document. Exposure to absolute maximum ratings for extended periods of the time can adversely affect reliability.

(1) Refer to reflow profile for soldering conditions for surface mounted devices (SMD). Refer to wave profile for soldering conditions for through hole devices (DIP).

ELECTRICAL CHARACTERISTICS (T_{amb} = 25 °C, unless otherwise specified)							
PARAMETER	**TEST CONDITION**	**PART**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
INPUT							
Forward voltage	I_F = ± 60 mA		V_F		1.25	1.65	V
Capacitance	V_R = 0 V, f = 1 MHz		C_O		50		pF
Thermal resistance			R_{thja}		750		K/W
OUTPUT							
Collector emitter capacitance	V_{CE} = 5 V, f = 1 MHz		C_{CE}		6.8		pF
Thermal resistance			R_{thja}		500		°C/W
COUPLER							
Collector emitter saturation voltage	I_F = ± 10 mA, I_C = 2.5 mA		V_{CEsat}		0.25	0.4	V
Coupling capacitance			C_C		0.2		pF
Collector emitter leakage current	V_{CE} = 10 V	SFH620A-1	I_{CEO}		2	50	nA
		SFH6206-1	I_{CEO}		2	50	nA
		SFH620A-2	I_{CEO}		2	50	nA
		SFH6206-2	I_{CEO}		2	50	nA
		SFH620A-3	I_{CEO}		5	100	nA
		SFH6206-3	I_{CEO}		5	100	nA

Note

- Minimum and maximum values are testing requirements. Typical values are characteristics of the device and are the result of engineering evaluation. Typical values are for information only and are not part of the testing requirements.
  Still air, coupler soldered to PCB or base.

CURRENT TRANSFER RATIO (T_{amb} = 25 °C, unless otherwise specified)							
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
I_C/I_F	V_{CE} = 5 V, I_F = ± 10 mA	SFH620A-1	CTR	40		125	%
		SFH6206-1	CTR	40		125	%
		SFH620A-2	CTR	63		200	%
		SFH6206-2	CTR	63		200	%
		SFH620A-3	CTR	100		320	%
		SFH6206-3	CTR	100		320	%
	V_{CE} = 5 V, I_F = ± 1 mA	SFH620A-1	CTR	13	30		%
		SFH6206-1	CTR	13	30		%
		SFH620A-2	CTR	22	45		%
		SFH6206-2	CTR	22	45		%
		SFH620A-3	CTR	34	70		%
		SFH6206-3	CTR	34	70		%

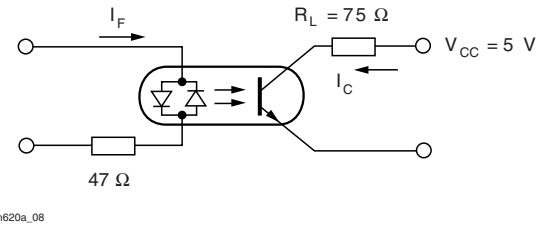


Fig. 1 - Switching Times Linear Operation (without Saturation)

SWITCHING CHARACTERISTICS (T_{amb} = 25 °C, unless otherwise specified)						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
Turn-on time	R_L = 75 Ω, I_F = ± 10 mA, V_{CC} = 5 V	t_{on}		3		µs
Rise time	R_L = 75 Ω, I_F = ± 10 mA, V_{CC} = 5 V	t_r		2		µs
Turn-off time	R_L = 75 Ω, I_F = ± 10 mA, V_{CC} = 5 V	t_{off}		2.3		µs
Fall time	R_L = 75 Ω, I_F = ± 10 mA, V_{CC} = 5 V	t_f		2		µs
Cut-off frequency	R_L = 75 Ω, I_F = ± 10 mA, V_{CC} = 5 V	t_{ctr}		250		kHz

SAFETY AND INSULATION RATINGS						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
Climatic classification (according to IEC 68 part 1)				55/100/21		
Comparative tracking index		CTI	175		399	
V_{IOTM}			10 000			V
V_{IORM}			890			V
P_{SO}					400	mW
I_{SI}					275	mA
T_{SI}					175	°C
Creepage distance	Standard DIP-4		7			mm
Clearance distance	Standard DIP-4		7			mm
Creepage distance	400 mil DIP-4		8			mm
Clearance distance	400 mil DIP-4		8			mm
Insulation thickness, reinforced rated	per IEC 60950 2.10.5.1		0.4			mm

Note

- As per IEC 60747-5-5, § 7.4.3.8.1, this optocoupler is suitable for "safe electrical insulation" only within the safety ratings. Compliance with the safety ratings shall be ensured by means of protective circuits.

TYPICAL CHARACTERISTICS (T_{amb} = 25 °C, unless otherwise specified)

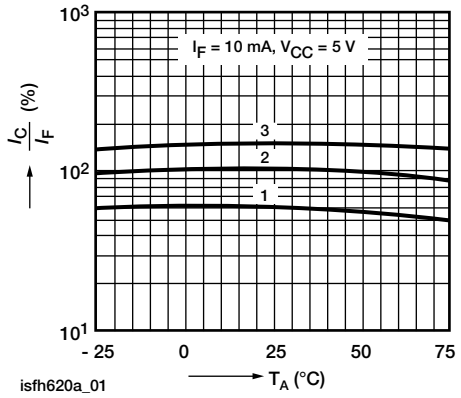


Fig. 2 - Current Transfer Ratio (CTR) vs. Temperature

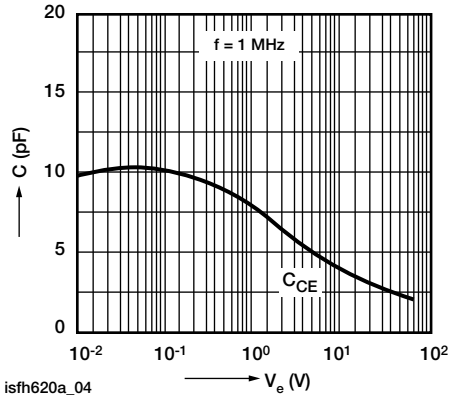


Fig. 5 - Transistor Capacitance (Typ.) vs. Collector Emitter Voltage

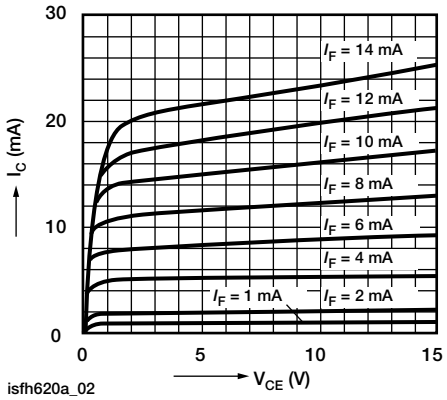


Fig. 3 - Output Characteristics (Typ.) Collector Current vs. Collector Emitter Voltage

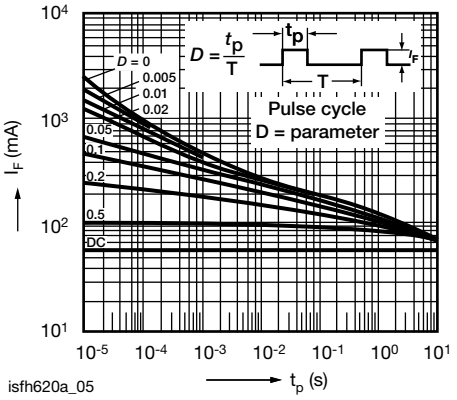


Fig. 6 - Permissible Pulse Handling Capability Forward Current vs. Pulse Width

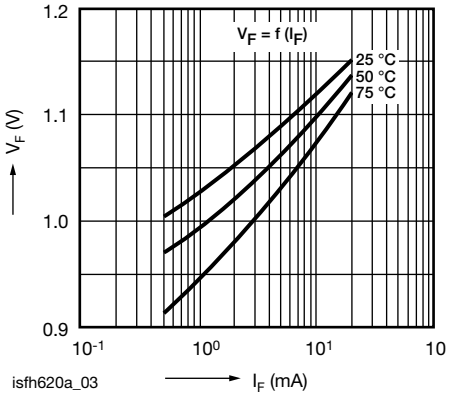


Fig. 4 - Diode Forward Voltage (Typ.) vs. Forward Current

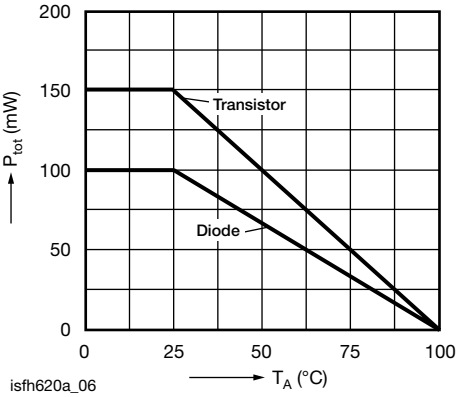


Fig. 7 - Permissible Power Dissipation vs. Ambient Temperature

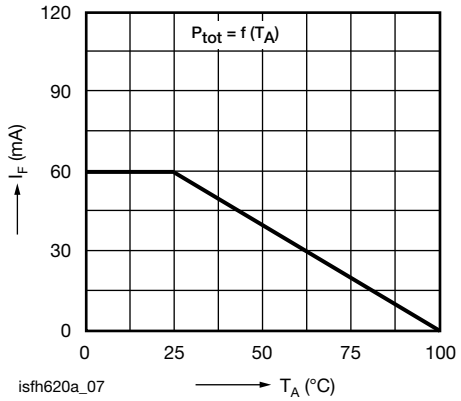
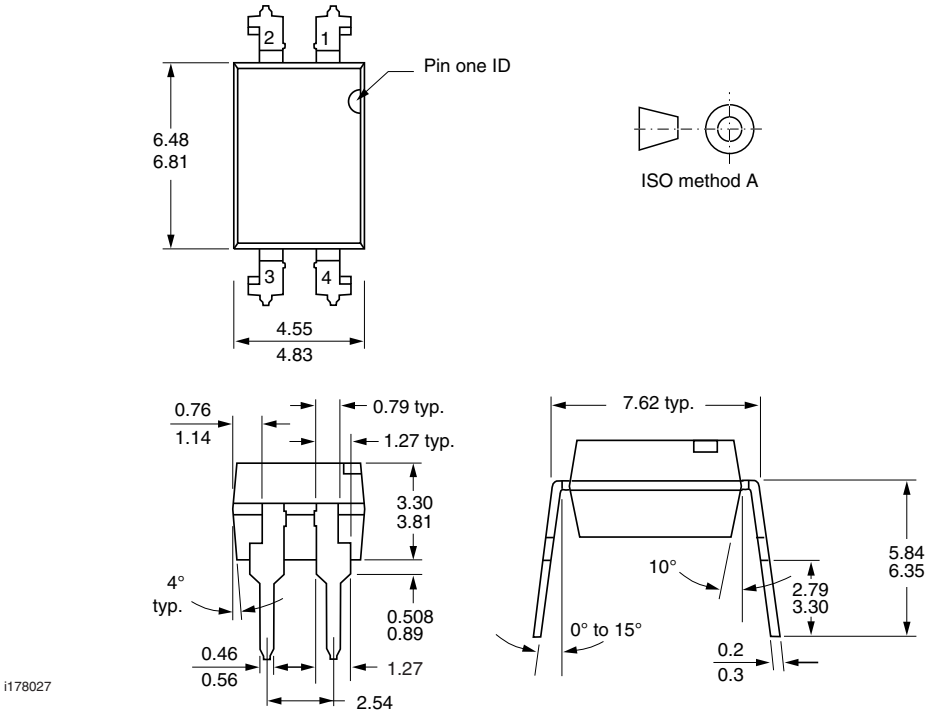
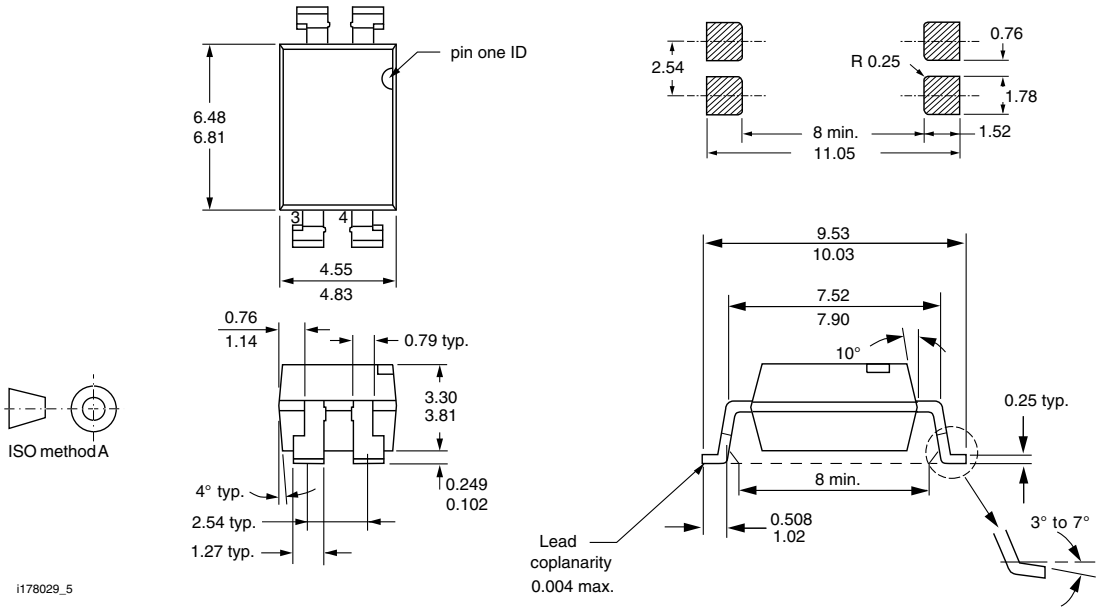


Fig. 8 - Permissible Diode Forward Current vs. Ambient Temperature

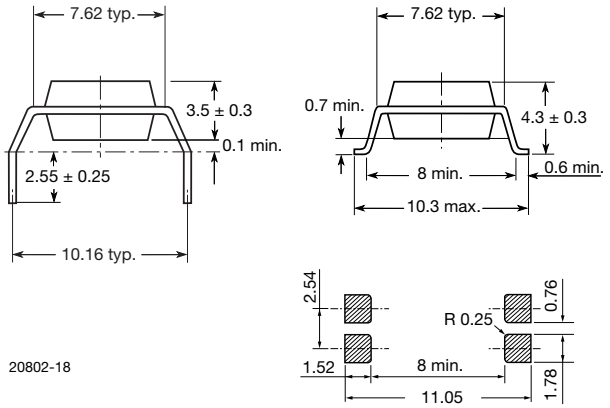
PACKAGE DIMENSIONS in millimeters



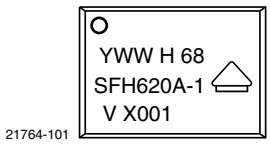
PACKAGE DIMENSIONS in millimeters



Option 6 **Option 7**



PACKAGE MARKING (example)



Notes

- Only options 1 and 7 are reflected in the package marking.
- The VDE Logo is only marked on option1 parts.
- Tape and reel suffix (T) is not part of the package marking.

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